

Interference Objectives for Earth Stations On-Board Vessels (ESVs) to Terrestrial Microwave Links

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The Growth in ESV Deployment

- Rapid growth in ESV installations;
 - 2003 - Approximately 500 ESVs worldwide
 - 2009 - Approximately 3000 ESVs worldwide
- Rapid growth in applications requiring ESV connectivity;
 - Back office connectivity for ship's business
 - Internet connectivity for passengers and crew
 - Video programming
 - Mobile telephony on board

All of which leads to ...

- a dramatic increase in:
 - the number of ships equipped with ESVs;
 - the demand for bandwidth; and,
 - the number of port visits.
- a requirement for an industry consensus on interference objectives for ESVs as required in the FCC Report & Order (FCC-04-286).

ESV Regulatory Chronology

- 2003 – ITU-R Resolution 902 (WRC-03)
ITU-R Rec. 37 (WRC-03)
ITU-R Rec.'s S.1587, SF.1589,
SF.1648, SF.1649, SF.1650
- 2005 – U.S. Regulations for ESVs
FCC-04-286
- 2005 – European ESV Decisions
CEPT/ECC Dec. (05)09 & (05)10
CEPT/ECC Rep.'s 69, 91
ETSI ENs 301 447, 302 340 & 301 843-6
- 2006 – CITELE PCC-II Resolution 33
CITELE PCC.II/RES. 33 (VII-06)
CITELE PCC.II/REC. 14 (VI-05)

Harmonized Regulations in Europe

ETSI Standards
CEPT/ECC Decisions & Reports

ETSI Standards for ESVs

- EN 301 447 (C-Band ESVs) & EN 302 340 (Ku-Band ESVs) provide all technical requirements for ESV systems that will be marketed and used in the territorial seas of the CEPT member countries;
- EN 301 843-6 provides the EMC requirements for protection from electromagnetic radiation emitted by ESVs

CEPT/ECC Decisions on ESVs

- CEPT/ECC Dec. (05)09 – C-Band ESVs
Provides for free circulation of C-Band ESVs under the technical guidelines of the Decision. Requires frequency coordination to operate in the territorial sea or, as per Report 91, operation to 20 km from coast operating in the gaps in the in the FS channel plan (see Report 91).
- CEPT/ECC Dec. (05)10 – Ku-Band ESVs
Provides for free circulation of Ku-band ESVs in the lower half of the band up to the port.

CEPT/ECC Reports on ESVs

- CEPT/ECC Report 69
“Formats for submission of information from administrations to the office on conditions for operation of earth stations aboard vessels”
- CEPT/ECC Report 91
“Compatibility of Earth Stations on board Vessels (ESVs) transmitting within the gaps in the CEPT Fixed Service Channel plan for the lower 6 GHz band(5 925-6 425 MHz)”

Europe Summary

- CEPT/ECC Decisions and Reports provide all necessary regulatory and technical requirements for 'free circulation' of ESVs within the CEPT countries;
- These regulations also allow ESVs to operate much closer than the ITU-R Res. 902 minimum distances without risk of interference;
- Posting additional national requirements insures ESV operator compliance.

Harmonized Regulations in the Americas

National Regulations
CITEL Resolutions

National Regulations in the Americas

- United States (FCC 486-04)
- Canada
- Brazil (In Public Consultation)

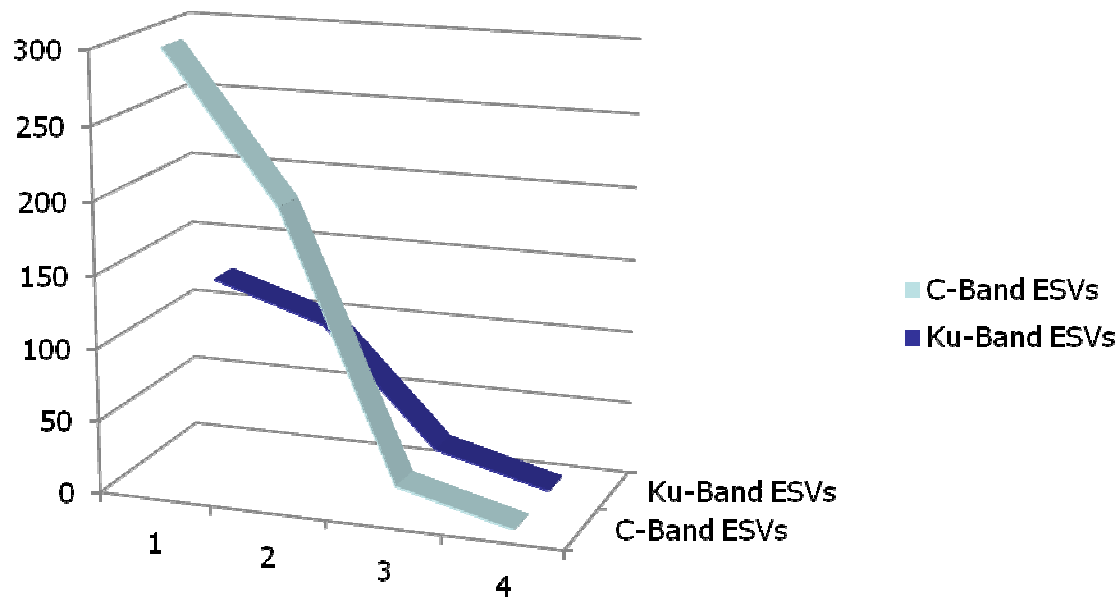
CITEL PCC-II Res. 33

- Encourages CITEL Administrations that authorize the operation of ESV networks and/or terminals to do so in accordance with the provisions set forth in Recommendation PCC.II/REC. 14 (VI-05);
- Subject to national regulations for ESV operation, an ESV network authorized by a CITEL Administration may be deemed permitted to operate in and near the territorial waters of other CITEL Administrations so long as it actually does operate in accordance with such national regulations;
- To maintain a database of country-specific information relating to ESV operations in the Americas and regional ESV network operators in the form specified in the Annex to this Resolution

Americas Summary

- CITEL Res. 33 and Rec. 14 give the requirements and the conditions necessary for a CITEL Regulator to determine that ESVs licensed by another CITEL Administration will not cause harmful interference;
- A few additional procedures enable the Regulator to recognize the license from another CITEL Administration with confidence; and,
- Authorized ESVs can operate in territorial seas without risk of interference.

Regional Harmonization: Effect on Minimum Distance



Regulatory Considerations: Frequency Coordination

- With the exception of some countries in the Americas Region, most countries have opted for frequency avoidance rather than frequency coordination;
- Frequency avoidance reduces the administrative workload but restricts ESV deployment unnecessarily in many cases;
- Frequency coordination can be practical and provide reasonable results that allow for the growth of the ESV industry while protecting the FS systems in the same bands.

How do we develop suitable interference objectives for ESVs?

Taking a cue from Mobile Communications

- Monte Carlo simulation takes into account the range & movement of the transmitter(s) with realistic parameters that reflect the rate of movement and transmitter density;
- Based on well-established propagation models (e.g. ITU-R Rec. P.452);
- This approach was used successfully in modeling the potential for interference from GSM systems on ships into terrestrial GSM systems (ECC Rep. 122).

Adapting this approach to ESVs

- Operational parameters already defined in Radio Regulations and FCC rules;
- Methodology for defining the limits of the operating areas is also well established;
- Methodology and tools for Monte Carlo simulation of mobile transmitters are available (e.g. SEAMCAT from ERO)
- NSMA is the organization to host this work item.

Thank you for your attention

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